

Unit 13

Day 1

Algebra of Functions

$$f(x) = x - 3$$

$$D_f = (-\infty, \infty)$$

$$g(x) = 3x + 4$$

$$D_g = (-\infty, \infty)$$

$$f(x) + g(x) = f + g = x - 3 + 3x + 4 = 4x + 1$$

$$\begin{matrix} f - g = f(x) - g(x) = (f - g)(x) = x - 3 - (3x + 4) = -2x - 7 \\ (f - g)(x) \end{matrix}$$

$$fg = fg(x) = f(x) \cdot g(x) = (x - 3)(3x + 4) = 3x^2 - 5x - 12$$

$$\frac{f}{g} = \frac{x - 3}{3x + 4}$$

$$\frac{g}{f} = \frac{3x + 4}{x - 3}$$

$$m(x) = \sqrt{5x}$$

$$D_m = [0, \infty)$$

$$n(x) = 8x - 1$$

$$D_n = (-\infty, \infty)$$

$$m^2 + n = (\sqrt{5x})^2 + 8x - 1 = 5x + 8x - 1 = 13x - 1$$

$$3mn = 3(\sqrt{5x})(8x - 1) = 3\sqrt{5x}(8x - 1) = 24x\sqrt{5x} - 3\sqrt{5x}$$

$$n - 3m^2 = 8x - 1 - 3(\sqrt{5x})^2 = 8x - 1 - 15x = -7x - 1$$

$$\frac{2m}{n} = \frac{2(\sqrt{5x})}{8x - 1} = \frac{2\sqrt{5x}}{8x - 1}$$

$$(f + g)(x) = f(x) + g(x)$$

$$(f - g)(x) = f(x) - g(x)$$

$$(fg)(x) = f(x) \cdot g(x)$$

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$$

$$a(x) = x^2 - 1$$

$$b(x) = 2x + 4$$

$$(a+b)(3) = a(3) + b(3) = 8 + 10 = 18$$

$$a(3) = 3^2 - 1 = 8$$

$$b(3) = 2(3) + 4 = 10$$

$$(a-b)(-2) = 3 - 0 = 3$$

$$a(-2) = 3$$

$$b(-2) = 0$$

$$(ab)(3y) = \frac{a(3y)}{b(3y)} = \frac{9y^2 - 1}{6y + 4}$$

$$a(3y) = (3y)^2 - 1 = 9y^2 - 1$$

$$b(3y) = 6y + 4$$

$$(ab)(3y) = (9y^2 - 1)(6y + 4) = 54y^3 + 36y^2 - 6y - 4$$

$$\left(\frac{a}{b}\right)\left(\frac{1}{2}\right) = \frac{\left(\frac{1}{2}\right)^2 - 1}{2\left(\frac{1}{2}\right) + 4} = \frac{\frac{1}{4} - 1}{1 + 4} = \frac{-\frac{3}{4}}{5} = -\frac{3}{20}$$

HOMEWORK: UNIT 13 DAY 1:

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